



Southern California Repeater and
Remote Base Association
P.O. Box 5967
Pasadena, California 91117

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In the Matter Of:

**Allocation of Spectrum in the 5GHz Band
to Establish a Wireless Component of the
National Information Infrastructure**

RM-8653

**Re: Comments of the Southern California Repeater
and Remote Base Association on the Petition for
Rulemaking by Apple Computers to re-allocate
portions of the 5.7GHz band to a new "Part 16"
unlicensed radio service.**

July 08, 1995

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SCRRBA

The Southern California Repeater and Remote Base Association (SCRRBA) is a voluntary association of owners and operators of Amateur Radio Service fixed and mobile relay stations operating primarily on the UHF and Microwave Frequency amateur bands. SCRRBA has provided frequency coordination for these activities since 1970. SCRRBA has actively participated in numerous Federal Communications Commission rule making proceedings pertinent to our activities.

SCRRBA currently maintains over 2,100 frequency coordination records. These data represent the activities of approximately 600 relay type amateur radio systems in Southern California. All of these systems operate on the UHF (420 MHz) and higher amateur frequency bands. These systems each have an average membership of about 60 amateurs. The largest of these systems has a membership exceeding 1,400.

SCRRBA is an active participant (usually the sponsor) in the amateur band planning process. We represent the fixed and mobile relay interests in regional band planning meetings. These meetings occur when the existing plans do not cover a desired activity, or when they need to be upgraded to match new or increased activities. These meetings are attended by representatives of ALL the amateur uses of the band. These band plans are adopted by unanimous consent of these representatives. These band plans cover activity in the Southern California region. In 1992, we met and developed a new set of band plans for the 5.6 GHz and other

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microwave amateur bands. Whenever we adopt a new band plan for our region, we submit it to the American Radio Relay League, Inc. (ARRL) to be included in national band planning efforts.

The members of SCRRBA are clubs and individual amateurs who construct and operate mobile and fixed relay amateur systems. These systems generally are available for normal operation 24 hours a day. Their fixed relay equipment is generally constructed and operated to provide a communications (and data) link between fixed points. The points of communication for these fixed relay stations do not change in the normal course of system operation. The typical systems are constructed with equipment manufactured for the commercial communications industry. This equipment is then modified for operation in the amateur band, and generally improved with devices developed experimentally. Our members use tools and equipment developed from a variety of sources. The experimenter amateurs (see San Bernardino Microwave Society) often develop techniques and devices that can be adapted for use on our mobile relay and fixed relay systems. These modifications result in system performance far above that of the original equipment.

Systems developed by our members are generally used for continuous on-going daily communications rather than the intermittent or random nature of HF communications more often associated with Amateur Radio operations. Various types of communications and control data are sent over these systems. The

members of most systems are "control" operators who are able to configure their system to meet any particular operational need. The control systems built to do this are all of amateur design and manufacture. There are no commercial equivalents that could be adapted to our needs. These systems can become quite sophisticated and complex. The experience we gain building and operating these systems allow us to have communications tools far superior to and far more flexible than any commercial system could ever be. We have the communications equipment in place. From long experience we know how to make our systems reliable. We have these systems running continuously which also allows us to develop communications skills. These systems, and the tools and skills residing within our membership provide a huge resource of communications capability. This resource is regularly tapped to provide many different types of public service communications. This resource is of tremendous value in an emergency¹. These Amateur Radio systems often have a service area that extends throughout the Southern California area and into neighboring states. This capability allows us to provide public service communications into and out of a disaster area when the commercial systems are not functioning². These systems communicate into and out of the region on fixed point-to-point links.

¹ Most commercial and public communications are disrupted or overloaded during most any type of emergency. When the emergency is as severe and widespread as the recent Los Angeles earthquake, Amateur radio is often the sole source of communications for officials and the public alike. Many of our members' systems were heavily used during the earthquake aftermath. Many operated nearly continuously.

² The telephone system was shut off to incoming calls from out of state for many days after the recent earthquake. The area shut off for the first day or two was nearly ten times that actually affected by the earthquake. This meant that relatives and officials in areas outside Southern California could not call in on the telephone to areas where there was no damage at all. Our members' systems handled hundreds of

During the early 1980's, the need for point-to-point operation in the microwave amateur bands became quite obvious as the frequencies allocated (by band plan) in the lower UHF bands became full to overloaded. The rapid increase of packet (digital) radio "backbone" (point-to-point or multipoint) operations placed a serious burden on this already overloaded spectrum. Amateur Television operators also began to build point-to-point relays for their activities. There is no usable spectrum in the 420-450 MHz amateur band for television relay³. TV and FM fixed relay operations in the 902-928 MHz band were begun, and then rapidly curtailed⁴.

The 1240-1300 MHz band is where the primary Amateur television "mobile relay" (repeater) activity takes place. All available TV frequencies in that band were occupied before the 902-928 MHz spectrum was even released to Amateur operations. The next higher bands available to the Amateur Service are the 2.3 and 3.3 GHz bands. These bands are too narrow to accommodate high density duplex operations.

calls each from people all over the Southwest who could not call their relatives and friends in Southern California, an area of some 20 million people.

³ Television relay describes fixed point-to-point use. Regular Amateur TV operations, while generally occurring from fixed home stations, are considered as "mobile" activity for the purpose of this submission.

⁴ The 902-928 MHz band is essentially unusable due to the severe susceptibility to interference of Pacific Teletrac's "Automatic Vehicle Monitoring" system operating on the same frequencies. This system is a wideband pulse system that is not "spread" or otherwise enhanced. This means there are 8 MHz wide receivers on virtually every communications site in the region that cannot tolerate the presence of a carrier (or equivalent) of ANY discernible strength within its passband. The 902-928 MHz band is shared with numerous services, and the "AVM" licensees have a higher legal priority than does the Amateur Radio Service. This renders that band virtually unusable for TV as well as virtually all mobile or fixed relay systems.

The 2.3 GHz band has become quite fragmented by Commission actions over the last two decades. The 2.390-2.400 GHz segment has very recently become the new home for a smaller version of the "Part 16"⁵ type of activity proposed in the instant petition. The amateur community is preparing itself to share this spectrum with a huge influx of these unlicensed operations. There are, as of this writing, no specific technical data available on the equipment proposed by Apple Inc., or other manufacturers for use in the 2.390-2.450 GHz band. The 2.300-2.310 GHz segment of this band is still under threat of loss to the amateur service. This future status of this very important segment will determine the final usability of the 2.3 GHz amateur band. The amateur community needs to retain long term full use of the presently allocated segments of the 2.3 GHz band. These segments will support the many present activities as well as expanded Amateur television relay and low to medium bandwidth medium to long haul point to point services. There is no space for high density relay operations in this band.

The 3.3 GHz band is used extensively by Government as the primary user in the band. The recent studies by the NTIA⁶ showed that the 3.3 GHz band has the highest (economic) concentration of government use of any of the bands studied. The recent substantially increased pressure on the government to free lightly used spectrum for non-government uses can only result in an increase in the usage in the

⁵See FCC NPRM 94-0272 and First Report and Order 95-47

⁶See NTIA Preliminary Report

remaining government spectrum. The Amateur Radio Service has been successfully and courteously sharing Government VHF, UHF, and Microwave spectrum for nearly 50 years.⁷ Much of the government spectrum usage is located away from populated areas which minimizes the interference potential. The amateur community cannot expect to make expanded use of this already densely populated band without significant risk of interference to government operations. This interference will result in the termination of the amateur operations, and the potential loss of the cooperative respect we have earned sharing government spectrum. The 3.3 GHz band is much too small for wideband duplex operations.

The next amateur band is the 5.6 GHz band⁸. This is the first microwave band with enough space for high and medium density duplex fixed relay operations, space to earth and earth to space satellite operations, and weak signal activities. The performance characteristics of this band allows the reliable operation of moderately long distance point-to-point paths (to and beyond 100Km). Immediately adjacent to this band is the 5.925-6.425 GHz Earth to Space domestic public fixed (satellite) uplink band and the private fixed microwave band. This puts the 5.850-5.925 GHz portion of the 5.6 GHz amateur band at risk from reallocation to the uplink band. This presumes the likely event that the government studies of the bands above 5.0 GHz continue to support such reallocation. This segment is also allocated for amateur earth-to-space and telecommand operations. The segment from 5.830 to

⁷ NTIA Preliminary Report Section 3 page 3-6 paragraph 1 and associated footnote 20

⁸ See SCRRBA 5.650-5.925 GHz Band Plan attached

5.850 is already allocated for amateur space-to-earth operations. It is clear that fixed relay operations in 5.830-5.850 GHz segment, while possible on case-by-case coordination, are generally not desirable. The segment from 5.759-5.761 GHz is where the weak signal communications activities occur. The amateur stations operating in this segment operate with very high power and very high gain antennas and very sensitive receivers. These stations often have sufficient performance to produce transmitted signals well above +60DBW ERP. These stations must have their operating frequencies totally free of interfering signals in order to receive the extremely weak signals encountered in this type of activity. These stations often point their antennas at the horizon in order to utilize tropospheric scatter or ducting modes. The band plans utilized by amateurs all around the country successfully provide protection to and from these weak signal activities.^{9 10}

DISCUSSION OF PETITION

Throughout this petition the petitioner uses lots of heavily loaded phrases and "buzz" words to describe who might make use of this new band and how this "NII Band" might serve portions of the proposed "National Information Infrastructure". This new "public" band requires equipment sold by the petitioner (at a profit). There

⁹ The SCRRBA database shows 18 high density point to point terminals coordinated in this band. Most of these are located at high elevation mountaintop communications sites

¹⁰ Amateur activity in the 5.6GHz amateur band cannot be determined from any one listing or database. As clearly stated by the ARRL in testimony to the NTIA and in discussions with Commission personnel, the ARRL Repeater Directory cannot be used for such information. The Directory is a listing suitable for use by "itinerant" mobiles to find a repeater to communicate through. Fixed relay devices such as commonly used on the 5.6GHz band are not suitable for itinerant mobile use and are not listed at all.

are pages and pages of words about Schools, Libraries, Community Networks, Equal Access, Native Americans, Information Superhighways, Etc. Very little of the petition is technically specific. The petitioner indicates that all the technical details can be worked out by the manufacturers and the Commission need not "worry" about rules or licensing for this band – as long as users of this band are required to conform to the not yet specified protocol these manufacturers invent.

The petitioner states that the proposed operations can accommodate current and proposed users¹¹, and at the same time that the new "NII Band" service needs to operate in "a protected spectrum band."¹² It is clear that these statements are incompatible and we seriously doubt that the first is correct or even intended by the petitioner. It is quite clear that the petitioner actually wants spectrum devoid of ISM, Government and Amateur operations in which to sell its products. The petitioner describes at some length how all users of this "NII Band" must conform to the "packet-switched protocol without priority weighting." It would appear that the petitioner wants to simply "hook" a radio transmitter and receiver to a digital network "LAN" and make few considerations of the effect upon the operating and adjacent spectrum. It would appear that spread spectrum techniques would actually make this proposed operation somewhat tolerant of and compatible with other types of services in the same spectrum. A carrier (of moderate strength) on a specific frequency generally does not render a spread spectrum system

¹¹ petition summary at 9 and petition section VI at 2 and at 13

¹² petition summary at 2, petition at 4,

inoperative, yet it would appear that the proposed equipment would be rendered inoperative by such a carrier. This conclusion is inferred from the petitioner's insistence on "protected spectrum" and that all users conform to a switched packet protocol. Spreading the transmission over even more bandwidth would make the proposed system even more impervious to interference and would result in much less interference to other services. The petitioner's insistence on using an interference susceptible transmission media indicates a concentration of effort on "handling bytes". More effort needs to be placed upon how to get those same bytes transmitted and received efficiently rather than just inexpensively. We are most concerned about the concept of industry driven regulations and protocol when the principal proponent shows so little regard for existing users and absolutely no consideration for adjacent users.

The petitioner admits that there are some types of communications which cannot conform to the proposed protocol and summarily relegates them to wired or fixed common carrier service¹³. These comments make it very clear that the petitioner does not consider that amateur service has any value or place occupying this spectrum. We seriously doubt that the petitioner has considered the effect of an amateur "weak signal" station transmitter on the "NII Band" equipment operating within the beam pattern of such a station. We are certain that the petitioner has not considered how the accumulated power of many "NII Band" stations will raise the noise floor at the amateurs' receiver at either a weak signal station or at a fixed relay

¹³ petition section V at 10

station. It is our position that these effects must be considered carefully in any allocation action and that the amateur operations must be protected by effective regulatory means. Radioastronomy and NASA space network operators not only insist on absolutely NO other signals inside their spectrum, but they are extremely concerned about adjacent spectrum uses. We are being asked to tolerate an unlicensed country wide explosion of digital toys on our exact operating frequencies.

The amateur community must count on the Commission for regulatory and operational protection from commercial users. The amateur community cannot produce income or revenue from its activities and cannot "fight back" effectively against powerful economic interests such as the petitioner. The amateur service provides services for the "public good" and has done so for many more years than the petitioner has existed. We cannot justify having our spectrum effectively taken away for a commercial interest under the guise of "public good." In any spectrum sharing arrangement, the parties must operate on a "level playing field." Any commercial user will be easily able to economically overpower the amateur operators by simply deploying so much equipment that the amateur is driven off the band. In the proposed "community network" concept, the amateur will be pressured to cease operations by the very community in which the amateur lives and operates. There are many amateur stations located at schools or universities. These stations serve well as part of the educational opportunities at those schools. The use of this proposed "NII Band" at that same school would immediately result in the amateur

station being forced to cease operations in the band. Even if the amateur allocation is primary to the "NII Band" unlicensed operations, the amateur will be forced to cease operations. Visualize explaining to the university president that the new million dollar wireless network providing computer network access around the campus and to the "National Information Superhighway" cannot operate when the university amateur radio station is conducting moonbounce or tropospheric scatter experiments or controlling the amateur station via a fixed relay. The amateur station will be summarily told to cease operations and may even be thrown off the campus depending upon how technically paranoid the university computer staff is. This is hardly an acceptable way of "meshing with.. most all existing or planned uses."¹⁴

Amateur operations are intrinsically neither more or less important than the proposed "millions of Americans" who might occupy the NII band using the petitioners' equipment. The amateur bands are already available to those same "millions of Americans" the petitioner is trying to reach through a very simple licensing process where the operator is licensed, not the equipment. These bands are already available for a non-commercial use – the Amateur Radio Operator. This is the key to this petition. The petitioner apparently wants to obtain "free" spectrum for "free" and make large amounts of money selling equipment onto what can easily become a digital "CB" band¹⁵. The petitioner apparently wants to circumvent both

¹⁴ petition section VI at 2

¹⁵ The "CB" term refers to the 27 MHz "Citizens Band" allocated nearly 40 years ago for use by regular citizens for basic radio communications. The Commission made this allocation (out of an amateur band, interestingly enough) with the best of intentions. This spectrum was put to uses no one could have foreseen. The explosion of activity and rampant total disregard for the regulations

the licensing process and the fee process whereby a commercial use pays some resemblance to both costs and value for the spectrum. The commercial venture then has the vested interest to make sure that the operations on that spectrum are such that they are profitable and managed so that the profit can continue. This profit cannot continue if the system is improperly used or causes interference resulting in the loss of the license to operate the system. The petitioner apparently wants to circumvent this process and place the responsibility for effective radio system management in the hands of untrained and unlicensed operators.

There have been considerable undocumented "discussions" of this petition on the existing information "superhighway."¹⁶ These discussions tout this proposal as a way to obtain "free long distance telephone service" and free access to many commercial services. These same discussions make the petitioners' position quite clear about amateur operations. Amateur operations are to be removed from the band as being "undesirable" uses. These same discussions make it quite clear that many perceive this petition as an opportunity for a digital "CB" with its attendant problems and benefits. The existing analog "CB"¹⁷ has been abandoned by the Commission as totally uncontrollable. The petitioner indicates that the expected

have become legend. The Commission has formally given up on this band and does not even attempt to enforce the regulations. It is our hope and plea that a repeat of this disaster will not be allowed to occur.

¹⁶ These "discussions" are not formally recorded and distributed over the petitioners name so that proper analysis and comments can be made. We consider that these discussions by some of the individuals in support of the petition may more accurately reflect the true intents behind the petition than does the petition itself. As these discussions are not formal they must be taken for what they are - informal comments.

¹⁷ See footnote 15 supra

cost of the devices for this band will place them well within reach of individuals with even modest incomes¹⁸. The potential for these devices to be sold by the local computer superstore along with every computer as an inexpensive way to gain access to the digital network is a scary thought. We urge the Commission to act to prevent a reoccurrence of the "CB" horrid mess from happening to any new unlicensed allocation.

These undocumented "discussions" call into question the actual intent of the proposals by the petitioner for uses at 2.390-2.400GHz. The petitioners' proposals there seem to be a successful approach to obtaining spectrum for unlicensed PCS while continuing reasonable access by amateur operators. The petitioners "undocumented" statement that the amateurs are undesirable and are to be removed causes us to be quite concerned that the petitioner does not intend to be a good neighbor. The petitioner has not put forth any technical specifications for the equipment in this band. We are extremely concerned that the petitioner is trying to obtain another much larger allocation at the expense of the amateur community. The proposed allocations at 5 GHz will allow much higher power levels and much larger areas of coverage, all still without any technical specifications. This is quite worrisome.

Even though the petitioner wants to take away a very important amateur band, the proposals have basic merit. We believe that with the proper analysis the

¹⁸ petition section VI at 23 footnote 25

Commission will be able to allocate spectrum for a form of unlicensed digital service without destroying the amateur band at 5.6 GHz. We urge that sufficient regulations be applied to prevent this allocation from becoming another "CB" band. We would suggest that if the petitioner demonstrated sufficient control of out of band radiation that operation closer to the very important radio astronomy band at 4.990-5.000 GHz could be accomplished. The 5.150-5.300 GHz band should provide the principal requirements of the petitioner and allow the "Hyperlan" development in the United States. This band could be authorized for the power levels necessary to provide the longer distances the petitioner requests. Proper management and technical design might provide justification for additional allocations adjacent above and below this segment allowing better interference suppression and more efficient usage. We suggest that a compatible form of spread spectrum emission should be required in order to provide the end user protection from interference that the manufacturer might not otherwise choose to provide.

Portions of the 5.725-5.875 GHz band could also be utilized on a limited basis if adequate technical limits are imposed and if the amateur service obtains exclusive Primary Non-Government allocation status. Use of this band segment should be limited to spread spectrum class devices with similar power limitations as are applied to the new unlicensed PCS at 2.390-2.400 GHz. These devices should be required to occupy the entire band segment to minimize the accumulated noise floor. These devices should not be allowed long distance communication. We suggest

500M is a reasonable value. This should be more than adequate for a medium sized office complex or K-12 school where more distance is not needed. With separate allocations with separate capabilities, the manufacturers have the opportunity to provide a lower cost unit where only short distances are needed. Where an interference problem exists with amateur operations, equipment for the 5.150-5.300 GHz segment can be used. These lower power lower cost units should be manufactured so as to be able to change to the 5.150-5.300 GHz segment by switch selection or even automatically if they encounter interference. Higher power units must not be allowed access to the 5.725-5.875 GHz segment.

CONCLUSIONS

The petition has merits and flaws. We believe we have pointed out many of the flaws. The basic concept is of sufficient merit that further consideration should occur. We believe that the request for spectrum for the "NII Band" can be satisfied without destroying the Amateur usage of the 5.6 GHz band. We believe that a completely unregulated unlicensed "freeband" is NOT in the public interest. An unlicensed digital radio service may well be in the public interest, but it should not be allowed without sufficient safeguards to protect the existing spectrum users, the adjacent spectrum users and the end purchaser of the equipment. We believe this can be accomplished without undue regulation. We note that when the end user is unlicensed, such user does not take on any of the technical burden of responsible

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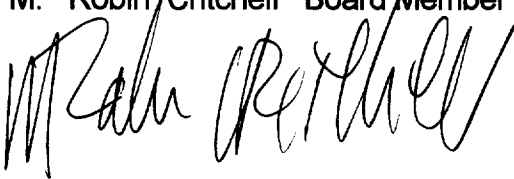
use of the spectrum. This burden is shifted to the equipment manufacturers. Commission oversight is required to insure that this burden is properly supported, and that the manufactured equipment is a responsible user of the spectrum. This oversight is usually in the form of technical regulations and may take the form of requiring type acceptance. We feel that the type acceptance process is likely to be the proper method of insuring that the regulations designed to protect the "public good" are actually being observed.

We urge the Commission NOT to allow wide area and or high power uses within the 5.650-5.925 GHz amateur band. We urgently request that the Amateur Radio Service have the Primary Non-Government allocation status in the 5.650-5.925 GHz band and that any other service be Secondary to the Amateur Service.

Respectfully submitted

For the SCRRBA Board and Technical Committee

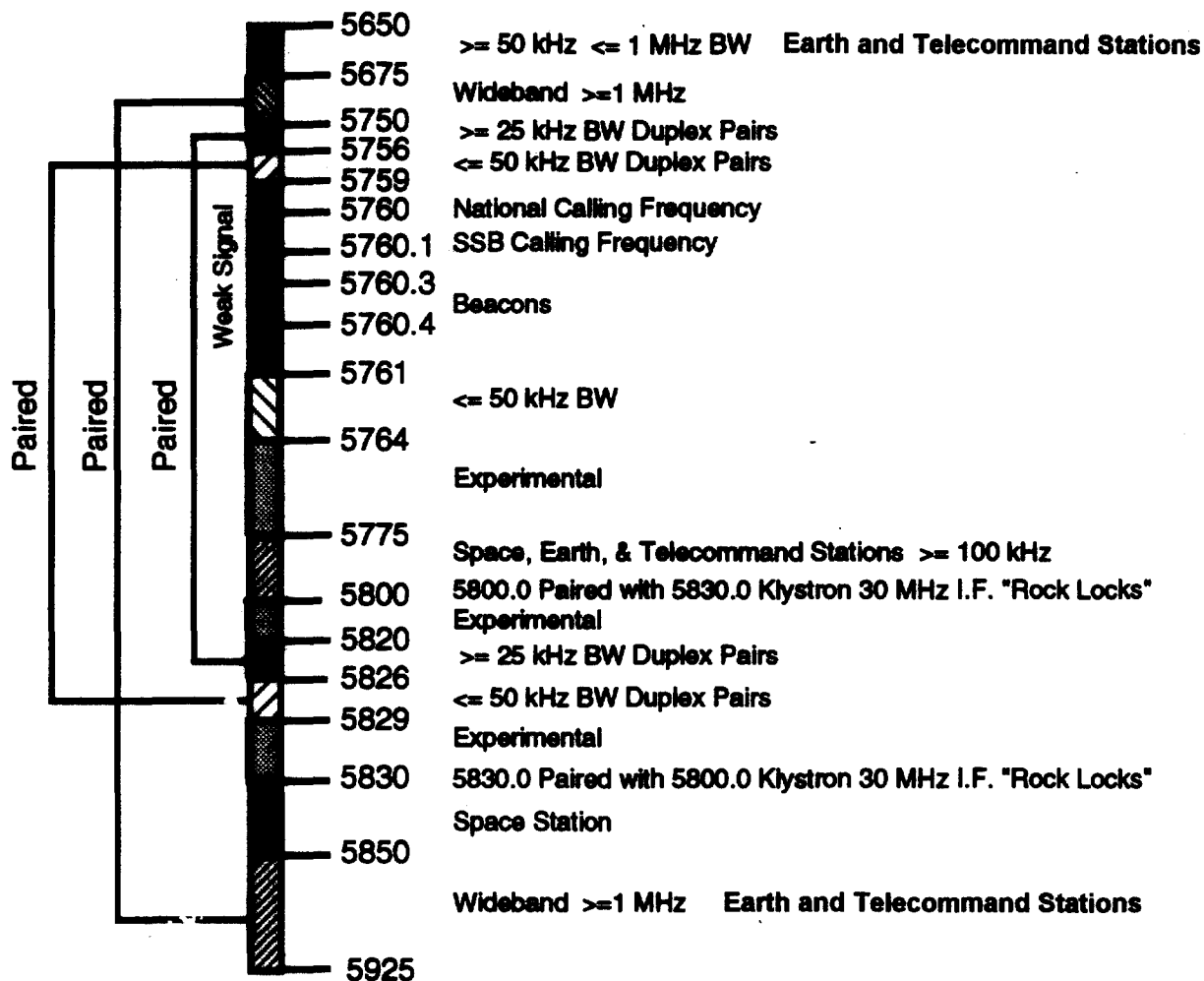
M. Robin Critchell Board Member

A handwritten signature in black ink, appearing to read "M. Robin Critchell", written in a cursive style.

Attachment: 1: 5.6 GHz band plan for Southern California



Southern California Repeater and
Remote Base Association
P.O. Box 5967
Pasadena, California 91117



5650-5925 MHz Band Plan
Adopted 9-26-92
SCRRBA